Disposal of obsolete pesticides in Nicaragua: A case study

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Introduction

Ekokem Oy Ab and Marena (Ministerio del Ambiente y los Recursos Naturales) of Nicaragua signed a contract in October 1998 for the elimination of 313 tonnes of agrochemical waste from Nicaragua. This was the second contract for the same purpose; the first project was carried out in autumn 1998 covering the removal and final disposal of 102 tonnes of material. The first project was financed by a World Bank loan to Nicaragua. Financing of the second project was planned to be a part of the loan from the Finnish Ministry for Foreign Affairs, but in December 1998 the Finnish Government, after the disastrous storm Mitch, decided to convert the unused part of this development credit for Nicaragua to a grant. A new contract between the Ministry for Foreign Affairs of Finland and Ekokem was signed in July 1999. The new contract included practically the same program already agreed between Ekokem and Marena by another contract signed in October 1998.

The first project was carried out in October 1998. Local work in Nicaragua was completed at the same moment when the tropical storm Mitch hit the country.

The second project was carried out in October 1999 in Nicaragua. It included a training period for local authorities and organisations about handling of obsolete pesticides. The packaging of material was carried out after the training period. The transportation to Finland started in October and the last containers arrived at Finland in December 1999. Some of the transit countries were reluctant to accept the material to or via their territory due to various reasons. Final disposal was completed in December 1999 - January 2000.

History

The imports of agrochemicals to Nicaragua, excluding fertilisers between 1980 and 1990 were ca. 90,000 tonnes. Subsidised by the Government and with substantial international aid together with generous credit facilities to farmers, pesticide use in Nicaragua was one of the highest in the world that time. Cotton farming reduced dramatically from 115,000 ha to less than 15,000 ha from 1983 to 1991. As 80% of pesticides were used in cotton farms, pesticide use and imports reduced accordingly. Nicaragua banned the import of DDT and many other organochlorines. Toxaphene was manufactured in Nicaragua, but its production stopped in the 1990s. As a result of these events an accumulation of obsolete pesticides started.

Marena carried out several inventories of obsolete pesticides in the country. In the Proposal for the Elimination of Obsolete Pesticides (1995), the quantity aimed to be exported for incineration was 929 tonnes.

As Nicaragua had not yet ratified the Basel Convention at that time, the invitation for proposals was sent in January 1997 to several companies, after Nicaragua had ratified the Convention. In this document a quantity of ca. 150 tonnes was prioritised to be removed within the limits of available financing.

Obsolete pesticides were stored in several places, in many cases in poor conditions. An environmental audit of areas around unofficial pesticide dumpsites in Nicaragua is being prepared. The preliminary results show contamination of groundwater in some of the storage sites.

During 1996 - 1998 Marena collected the obsolete pesticides in one central storage facility in Chinandega, 130 km north from Managua, where the major part of pesticides already were stored.

Project 1

The first project planned to remove ca. 100 tonnes of obsolete pesticides and was carried out during autumn 1998. This project was financed by a loan from the World Bank to Nicaragua. The aim was to remove the most toxic and harmful material at first hand.

The project was carried out under supervision of Ekokem. Subcontractors from the US and local workforce were used for repackaging and transportation.

Training of local workforce and the supervisors from Marena and other Nicaraguan governmental staff to use safety equipment including protective clothing, breathing masks, and the installed devices (emergency shower etc.) was carried out.

A final inventory of materials to be removed was done with the assistance and instructions of Marena representatives.

During the working period all material was repackaged either in fibreboard boxes, steel or plastic drums (200 l), or overpack drums (steel, 310 l). Individual packages were labelled in accordance with ADR and IMDG regulations. Ekokem representatives did classification in respect of the final treatment of the material. All visible spills around the areas where the repackaged material was located were cleaned and packaged for transportation.

The repackaged material was loaded to eight 40 feet sea transport containers and secured for transportation.

The transportation route was Chinandega, Puerto Cortez (Honduras), where the containers were shipped via Port Everglade (USA) and Rotterdam (Holland) to Helsinki (Finland) and by road transport to their final destination Riihimäki, where the containers arrived on Monday, 14 December 1998.

A delay of 12 days during the transportation was caused by the storm "Mitch" in Honduras. The trucks with containers had to stay in a parking area near Tegucigalpa until the roads were repaired after the serious damages the heavy rains had caused in the area.

Table 1. Total quantity of waste removed in project 1 (1998)

DDT	50,884
Heptachlor	17,064
Amitrole	1,083
Azinphos-ethyl	492
Azinphos-methyl	5,787
Methyl Parathion	4,126
Endrin	271
Zinc Phosphide	8,006
Mephosfolan	2,319
Methamidophos	1,067
Paraquat	146
Toxaphene	4,340
Epichlorohydrin	594
Amtrax Vaccine	5,978
Total gr. weight	**102,157 kg**

The two last items, epichlorohydrin and Amtrax vaccine were decided to be removed together with the obsolete pesticides.

The incineration of waste material was completed in January 1999.

Project 2

The second project was carried out in autumn 1999 including a training period, packaging of material, transportation to Finland and final disposal. The last drums were incinerated in January 2000.

The three day training program consisted of a two day course for emergency management in handling chemicals in general and the third day was designed especially for handling pesticides including following topics: toxicology, first aid and medical management, multi-casualty medical triage, case specific personal protective equipment and a table top exercise. 50 persons from various organisations in Nicaragua attended the course.

The packaging procedure was carried out in a similar way as the first project and mainly with same personnel.

All the material was finally loaded to 22 sea transport containers for transportation to Finland. Originally the shipping route was to be same as in the first project. Due to reasons explained below the final route was from Corintho through Panama Canal to Europe and Finland.

Incineration

All materials from both projects were incinerated in Ekokem´s two high temperature incinerators in Riihimäki, Finland. The rotary kilns use temperatures over 1300°C having a special kiln cooling system to enable the use of high temperatures. The annual capacity of the kilns is 65,000 tonnes of waste. The gas cleaning process in both kilns has been designed to fulfil the strict emission limits within European Union.

Remarks

During the first project, in October 1998, the tropical storm Mitch hit the area just after the packaging work was done. In Chinandega, Northern part of Nicaragua, the storm caused exceptionally heavy rains and serious damages. Bridges and roads were destroyed in Honduras, which caused a delay in the transportation.

The second project was carried out in October 1999. Original intention was to do the second project in January - February, which is the dry and mild season in Nicaragua. The start was delayed due to changes in contract and the project group had to start the work during the rainy season. Two alternative routes were notified in accordance with Basel Convention in case problems would occur in transporting.

Due to various reasons it was not possible to use the planned route via Honduras. The weather conditions in Honduras were difficult after heavy rain and the authorities in Honduras wanted to postpone the transportation. The project group was prepared for such problems having applied another transport licence using an alternative route via Costa Rica, Colombia and Panama and further to Europe. The competent authorities in Colombia and Costa Rica refused to accept the transit of the 22 containers via their territories. Finally a shipping company was found which took the material to Panama and Europe without calling ports in Costa Rica or Colombia. As the other transit countries were listed in the consent, it was still possible to transport the material in accordance with the Basle Convention and respective regulations in European Union.

Conclusion

Weather conditions and special transport requirements should be kept in mind in obsolete pesticide disposal projects. It is of great importance to ensure that transit countries are aware in forehand of the nature of the transportation. Countries who have recently ratified Basel Convention may not have enough experience in the notifying procedure and delays may occur.

Figure 1. Repackaging activities

Figure 2. Storage of repackaged pesticides

Appendix 1. Total quantity of waste removed in project 2 (1999)

Malathion	68,015
Dazomet + Diuron	783
Dithane	480
Metalazil (?)	8,074
Propargite	32,942
Triadimefon	310
Zinc Phosphide	4,896
Glyphosate	319
Mancozeb	1,594
Simazine	575
Propanil	35,742
Deltamethrin	626
Perfluidone	4,974
Bromadiolone	3,204
Chlorpyrifos	915
Mephosfolan	458
Methamidophos	1,881
Oxidimeton Methyl (?)	220
Tribufos (?)	661
Trichlorfon	10,003
Acephate	1,090
Diazinon	107,978
Tebupirinfos (?)	570
Cypermethrin + Atrazine	2,643
Chlorfenson	8,090
Chlorobenzilate	440
Metolachlor	255
Thiodicarb	216
Azinphos-ethyl	248
Endosulfan	1,088
Hexaconazol (?)	243
Folicote	264
Bendiocarb	320
Ferbam	2,648
Propineb	680
Quintozene	130
Brodifacoum	979
Metribuzin	426
Creosote	4,216
Ortophenyl Phenol	8,472
Dithiocarbamate (Sodium?)	270
Not identified (Daconil, Dalapon ?)	858
Not identified	1,844
Total gr. Weight	**320,640 kg**